Coleman Lecture 2018

Bees: Importance and Diversity

by

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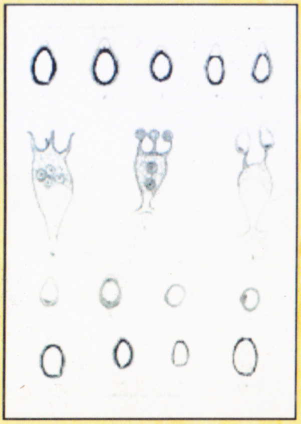
Dr. Leslie C. Coleman in his laboratory



A page from his publication in 1927 on *Ganoderma*

Colemania sphenaroides – a grasshopper named after Dr. L. C. Coleman in 1910

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Dr. L. C. Coleman

A pioneer of plant protection in Karnataka

The first decade of 20th century can be identified as a major landmark in the socio-economic development of Karnataka. The decade witnessed several interesting events in quick succession in the then princely State of Mysore – Asia's first hydro-electric power plant at Shivanasamudra across river Cauvery was established near Mysore, the world's longest power transmission line was commissioned in the state, Sir Ronald Ross carried out part of his studies on malaria vectors at Bangalore when in transit to Gudalur and helped design the underground drainage system for the city to tackle the problem of Gastro-enteritis, Kolar Gold Fields and Bangalore became the first cities in the country to get hydro-electric power and the Indian Institute of Science was established at Bangalore based on the recommendation of Nobel laureate Sir William Ramsay. The impact of these events on the position of eminence enjoyed by the State of Karnataka and the city Bangalore as we complete the first decade of the 21st century is quite obvious and needs no emphasis.

However, another important event that enabled the State of Karnataka to be what it is today, albeit in a very different domain, also unfolded in the same decade. The rulers of the then princely state, visionaries in real sense, clearly recognized the need for strengthening agriculture - the backbone of our economy. One of the important decisions taken by the state was to bring the benefits of science and technology to agriculture by appointing a Government Chemist Dr. A. Lehmann and the establishment of Department of Agriculture. This was followed by the appointment of Dr. Leslie C. Coleman as the first Government Entomologist and Mycologist in 1908 and with this the education and research in entomology and plant pathology was formally introduced in the State.

Dr. Leslie C. Coleman undertook comprehensive studies on pests and diseases of almost all important crops of the state and devised effective control strategies. In fact his introduction of Bordeaux mixture to tackle the problem of kole roga (black rot) of arecanut continues to be an effective 'solution' (both metaphorically and practically) for the disease! Several of his studies both as a researcher and as an administrator helped formulate agrarian practices and policies that virtually prepared the State of Mysore for ushering in the 'Green Revolution' in the following decades.

Dr. Coleman was truly a multifaceted personality, his work on many insect pests and plant diseases has stood the test of time and his studies on the sandal spike disease has been rated as one of finest pieces of scientific investigation of plant diseases. His contributions in entomology, cyto-genetics, plant morphology, plant gall formation and even cancer research (post-retirement) truly reflect the wide canvas he painted in his scientific career. Dr. Coleman was way ahead of his times in everything he did; he was instrumental in establishing the Mysore Agricultural and Experimental Union in 1913 and invited farmer members to submit grant proposals for carrying out research – even today this appears a very novel idea. Dr. Coleman was an accomplished scientist, able administrator, policy advisor and above all a well wisher of the farmers of Mysore.

By the time Dr. Leslie C. Coleman remitted office in 1934 he had untiringly served the cause of farmers and agriculture in Mysore for more than 25 years and his stint as the Director of Agriculture, Government of Mysore, for 22 years is perhaps set for posterity! He virtually became a legend in his own life time among farmers of the state of Mysore - his adopted home. It is even said that he would visit villages on official tour and partake of food at farmer's house and even swallow down *ragi mudde!* just to instill confidence in the farmers that he was one of them and had their well-being uppermost in his mind. His single minded devotion to farmers cause earned him the respect of the state's farmers even today many octogenarian farmers remember him and there are farming families in malnad where his photograph adorns the doorway. He was also a household name among the sugarcane farmers of Mandya and a bust of Dr. Coleman can be seen at the Mandya sugar factory.

Working with farmers must have been tough for a foreigner like him especially when the freedom struggle was picking up and citizens generally did not trust the British officials. However, despite the unfavourable conditions he was able to win over the hearts of the farmers – surely he must have possessed great diplomatic and PR skills managing both the farmers and the bureaucracy of his highness the Maharaja of Mysore!

The upwelling of love and affection towards Dr. Coleman when he visited Mysore in 1953 (all the way from Canada at his own expense!) was not surprising at all. Such was his passion for improving the farming sector that he even submitted a 70 page report to the Government of Mysore outlining his impressions on the state of agriculture and possible strategies for improving the lot of farmers. This single act of Dr. Coleman submitting a report on the state's agriculture in personal capacity almost 20 years after he had remitted office speaks volumes of his mission for the farmers he loved and cared for.

Dr. Coleman's achievements are not surprising considering the fact that he was totally devoted to his mission and was by nature a workaholic who woke up at 4.00 am and went to bed not before 1100 pm.

A few achievements of Dr. L. C. Coleman

01. Following his appointment, Dr. Coleman organized the Division of Entomology (study of insects) and Mycology (study of fungi) in the Department of Agriculture in 1908.

02. Establishes several research farms in the then princely state of Mysore-which continue to function even today and initiates research on pests and diseases of coffee at BR Hills and in Chikmagalur district

03. Trains several Indians in entomology and pathology who later distinguish themselves in agricultural research (Dr. Kunhikannan and, Dr. Subramaniam, to name just a few).

04. Instrumental in establishing the 'Agricultural School' at Hebbal in 1906 and was its first Principal. Incidentally it is this school that has grown in the University of Agricultural Sciences, Bangalore.

05. Initiated research on fungal diseases of arecanut, the major crop of malnad or Western Ghats at Marthur farm near Talguppa. Introduced the use of 'Bordeaux mixture' for the first time in the country to tackle crop losses caused by 'kole roga' or 'black rot' in arecanut. This practice is still the mainstay of disease management in arecanut.

06. For the first time in the country 'legal or legislative control' of an insect pest is introduced in the country for coffee stem borer-which required planters to remove infested plants and destroying them by enacting a law!

07. Established a society 'Mysore Agricultural and Experimental Union' in 1913 which even comprised farmer members. So progressive was Dr. Coleman his thinking that he invites proposals from farmers for carrying out research on their farms.

08. Solved the riddle for spike disease of sandal and proves that the disease can be transmitted from tree to tree by an insect vector.

09. Solved the problem of coffee leaf rust which was introduced to India from Sri Lanka.

10. Initiated steps to undertake biological control of insects and even weeds. He is credited with experimenting with using an insect to control the scourge of Lantana weed.

11. The Coffee Experimental Station (Presently Central Coffee Research Institute) was established at Balehonnur in Chikmaglur district under his leadership in 1925.

12. Organized the construction of Sugar Factory in Mandya and even arranged for financial guarantee! To support this he also established the 'Parasite Breeding Station' for biological control of sugarcane pests.

13. Served as Director of Agriculture, Govt. of Mysore for 22 long years! Several plans, strategies were formulated and implemented for improving food production.

14. A multifaceted personality he was also the first person to describe the different forms of ragi with great meticulousness and there was no field he had left untouched from general botany, cytogenetics, entomology, mycology, physiology of plant gall formation, even cancer research (which he undertook after his retirement!).

15. So multifaceted was Dr. Coleman that he had clear prescription on the possible role of engineers in agriculture and had the task cut out for them in soil management.

16. He was perhaps the first scientist in the country to recognize the need for compiling data on agricultural statistics and in 1929 recommended the appointment of a 'mathematician with background in statistics' for all provinces to handle data in a scientific manner! Meticulous to the core, he was obviously keeping track of the phenomenal work in statistical data analysis of field experiments being carried out by R A Fisher at Rothamstead Experimental Station in England.

17. Fellow entomologists have immortalized Dr. Coleman by naming at least eight insects in his honour.

18. Gives a passionate call at the Indian Science Congress (1930) to invest in agricultural research and attract talented scientists and regrets the outlook of scientific establishment towards the less glamorous field of agricultural research. His words proved prophetic – for without investment in agricultural research that brought in green revolution India could not have become a strong economy that it is today. If an army marches on its stomach – a country that goes hungry can hardly walk leave alone marching!

19. He has left behind a huge body of writings on research and administration the important ones being "The Rice Grasshopper", "The *Jola* or Deccan Grasshopper", "Hairy Caterpillar *(kamblihulas)* in Mysore" , "Some Scale Insect Pests of Coffee in South India", "Ground Beetles Attacking Crops in Mysore", together with his "Notes on Sugarcane Cultivation in Java", "Report on the Coffee Berry-Borer in Java", and "Improvement of Coffee in the Dutch East Indies."

DR. L. C. COLEMAN, M.A., Ph.D. - AN OBITUARY

Dr. M. Puttarudriah
Head of the Division of Entomology
Mysore State Department of Agriculture

AGRICULTURISTS in general and entomologists in particular in India were grieved to hear the sad news of the demise, of Dr. Leslie C. Coleman (May Peace be on his soul!) by an accident in his native country on 14th. September 1954. Dr. Coleman was one of the pioneers in the field of Agricultural Entomology in India. Having started his career as Entomologist and Mycologist to the Government of Mysore in 1908, he made many outstanding contributions on our major crop pests. He built up the Division of Entomology on a sound basis and for the .first time, worked out the biology and control measures of serious pests like the paddy and *jola* grasshoppers, hairy caterpillers green bug on coffee and many other pests. A great collection of pests was built up and intensive research was undertaken. Many insects were described for the first time and many were named after him.

He has been immortalised more than once, as several insects named after him bear witness. An entire genus was erected as *Colemania* Bolivar with the species *sphenaroides* Bolivar as this serious pest of jowar called the Deccan Grasshopper was discovered and worked out in the northern districts of Mysore by him.

Apart from his contributions to the study of the paddy grasshopper, another new species of grasshopper found in paddy fields has been named after him as *Hierocerуx colemani* Bolivar.

His name has been a household word among coffee planters. He has saved their coffee industry from the ravages of not only *Koleroga* but also of green bug which again was worked out by him and so was named after him as *Coccus* (*-Lecanium*) *viridis colemani* Kannan.

Even in the early days of his entomological career, he realised the importance of the beneficial natural agency in keeping the pest below economic level. He noted many hymenopterous parasites on crop pests and as many as six of them have been named after him: *Aphidius colemani* Viereck, *Apanteles colemani* Viereck, *Anastatus colemani* Crawford, *Bruchobius* (*Sphaerakis*) *colemani* Crawford, *Tetrastichus colemani* Crawford and *Telenomus colemani* Crawford.

During 1921 and 1933, he tried to introduce the lantana *Agromyzid* flies from Hawaii for the biological control of the introduced weed *Lantana camara* which has become a serious 'scourge in this country.

His contribution, in other fields of agriculture have been many and in" the field, of .entomology his works on "The Rice Grasshopper", "The *Jola* or Deccan Grasshopper", "Hairy Caterpiller *(kamblihulas)* in Mysore" , "Some Scale Insect Pests of Coffee in South India", "Ground Beetles Attacking Crops in Mysore", together with his "Notes on Sugarcane Cultivation in Java", "Report on the Coffee Berry-Borer in Java", and "Improvement of Coffee in the Dutch East Indies", etc,. etc., have been outstanding.

In a small space, it is "very difficult to express adequately the unforgettable contributions to the cause *of* the Mysore farmer and the small homage that a student of entomology can pay to the memory of the great scientist is to state that the foundation he laid in the Division of Entomology is secure and strong and the work that he did will sustain his successors to build up the fortress of teaching, research and plant protection that he aimed at. In fact, it is gratifying to state here that when he visited this country during 1953-54, he expressed his great satisfaction about this Division and hoped that he would come again after another interval to review the work here and note his satisfaction; but God willed it otherwise.

Dr. L. C. Coleman is a name which inspires all entomological workers and we in this Division hope to continue the work for the cause of cultivators he stood for.

Coleman Lecture - 2018

Bees: Importance and Diversity

Laurence Packer
Distinguished Research Professor, Department of Biology
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Over 20,000 species of bees have been described so far and over 700 of them have been recorded from India. I have hundreds of undescribed species in my laboratory waiting for me to have the time to describe them, the same is true of most entomologists with large collections of specimens. India is one of the countries where the number of species known is very seriously underestimated and where more basic taxonomic research is badly needed.

Very few bees look like, behave like or have ecologies like the bees that most people recognize as bees - the western domesticated honey bee. That one species, *Apis mellifera,* is used as an industrial scale pollinator almost worldwide. There are approximately 8 species in the genus *Apis* and India is unusual in having most of them - 6 species. But none of the other 700+ bee species in India or the 20,000+ species of bee worldwide are anything like honey bees.

In this talk I will outline the misconceptions people have about bees, those resulting from the idea that most bees are honey bees. I will talk about the diversity of bees in the world in general and India in particular. The wide range of morphological appearance of bees will be illustrated. I will also outline the enormous behavioural and ecological diversity of bees.

While most agricultural pollination is attributed to the domesticated honey bee, it is becoming increasingly understood that other insects are often as important, if not more important, than this one species. Some crops are very poorly pollinated by honey bees or not pollinated by them at all. For example, in one Californian study 41 wild bee species were found to pollinate watermelon and, on farms where pesticides were not used, the 42nd species (the honey bee) was not needed for an economically viable crop yield. Unfortunately, most agricultural practices work to the detriment of wild bee populations and, ironically, often result in decreased crop yields. This suggests that we need to understand how to promote bee populations.

Like most Hymenoptera, bees are haplodiploid - with healthy males resulting from unfertilized eggs, females from fertilized ones. Ultimately, sex in bees is determined by the genotype at a single gene locus and an individual must be heterozygous to be a female. Thus, haploids, which cannot be heterozygous, are male, but so too are homozygotes at the sex locus. These homozygotes are diploid males which either die, are sterile or result in triploid offspring. Diploid males are produced at increasing rates in smaller populations, and this has led to the suggestion that small populations of bees (and their relatives) are more at risk of extinction (through diploid male production) than are similar-sized populations of almost any other organisms. Negative environmental impacts are expected to have a greater impact on bees than most other organisms.

All of this suggests that we need to pay more attention to wild bees. We need to understand their taxonomy and their ecology. We need to understand what practices will help promote wild bee populations. I will end my talk with an outline of the various activities that we can all do to promote the health of wild bee populations.

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About the Author

If the bees were to pick one global spokesperson to champion their cause they would unanimously pick Prof. Laurence Packer, Distinguish Research Professor, York University, Toronto, Canada. Prof. Laurence Packer has been a keen student of 'bees', 20,000 species in all, and not partisan to the domesticated 'honey bee' alone! Prof. Packer began observing bees and butterflies as an undergrad student and went on to study the bees of the genus *Halictus* in great detail for his doctoral thesis. His work is fashioned after the work of the elder 'guru' of bee biology. Prof. Charles D Michener and explores phylogenetics, systematics, taxonomy and biogeography of the bees from all over the world. He has served in various capacities on the Editorial Boards of leading journals like Sytematics and Biogeography, BMC Zoology, Insect Conservation and Diversity, Apoidea, Zootaxa, Canadian Journal of Zoology and several others.

His teaching assignments include a variety of courses from introductory ecology and evolutionary biology to applied entomology and advanced systematics and phylogenetics. Prof. Packer has published extensively on bees including 150 research papers, 13 book chapters and three books on biology and importance of bees as pollinators. A complete list of his publications can be found at http://www.yorku.ca/bugsrus/PCYU/DrLaurencePacker.

Prof. Packer is also passionate about art and theatre; an art installation titled 'Pollen Party' by his students won the Jury Prize in 2014. He was the bee consultant for a theatre production, 'Out of the Box' based on Dobie and Mackwood's 'Bugzzz-a cautionary tale' in 2012.

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